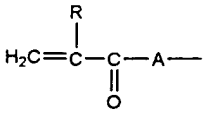
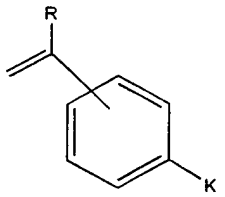
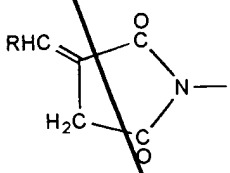
Y is an ethylenically unsaturated polymerisable group selected from the group consisting of

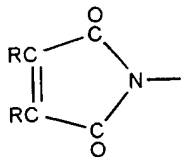




$CH_2=C(R)-CH_2-O-$, $CH_2=C(R)-CH_2\ OC(O)-$, $CH_2=C(R)OC(O)-$, $CH_2=C(R)-O-$, $CH_2=C(R)CH_2OC(O)N(R^1)-$, $R^2OOCCR=CRC(O)-O-$, $RCH=CHC(O)O-$, $RCH=C(COOR^2)CH_2-C(O)-O-$,



and



wherein:

R is hydrogen or a C_1-C_4 alkyl group;

R^1 is hydrogen or a C_1-C_4 alkyl group or R^1 is -B-X where B and X are as defined above; and

R^2 is hydrogen or a C_{1-4} alkyl group or BX where B and X are as defined above;

A is -O- or $-NR^1-$;

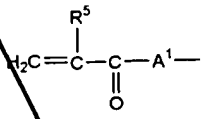
K is selected from the group consisting of $-(CH_2)_pOC(O)-$, $-(CH_2)_pC(O)O-$, $-(CH_2)_pOC(O)O-$, $-(CH_2)_pNR^3-$, $-(CH_2)_pNR^3C(O)-$, $-(CH_2)_pC(O)NR^3-$, $-(CH_2)_pNR^3C(O)O-$, $-(CH_2)_pOC(O)NR^3-$, $-(CH_2)_pNR^3C(O)NR^3-$ (in which the groups R^3 are the same or different), $-(CH_2)_pO-$, $-(CH_2)_pSO_3-$, and optionally in combination with B, a valence bond and p is from 1 to 12 and R^3 is hydrogen or a C_1-C_4 alkyl group;

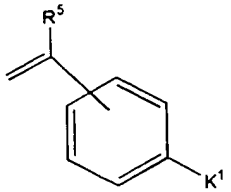
b) an aromatic group containing monomer of the general formula II

$$Y^1R^4 \qquad \text{II}$$

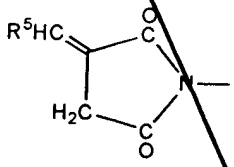
wherein Y^1 is selected from the group consisting of

Sub B cont'd

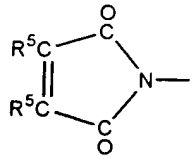




$CH_2=C(R^5)-CH_2-O-$, $CH_2=C(R^5)-CH_2\ OC(O)-$, $CH_2=C(R^5)OC(O)-$, $CH_2=C(R^5)-O-$, $CH_2=C(R^5)CH_2OC(O)N(R^6)-$, $R^7OOCCR^5=CR^5C(O)-O-$, $R^5CH=CHC(O)O-$, $R^5CH=C(COOR^7)CH_2C(O)-O-$,



and



wherein:

R^5 is hydrogen or a C_1-C_4 alkyl group;

R^6 is hydrogen or a C_1-C_4 alkyl group or R^6 is R^4;

R^7 is hydrogen or a C_{1-4} alkyl group or R^4;

A^1 is -O- or $-NR^6$-;

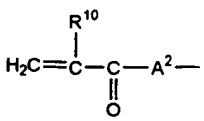
K^1 is selected from the group consisting of $-(CH_2)_qOC(O)-$, $-(CH_2)_qC(O)O-$, $-(CH_2)_qOC(O)O-$, $-(CH_2)_qNR^8-$, $-(CH_2)_qNR^8C(O)-$, $-(CH_2)_qC(O)NR^8-$, $-(CH_2)_qNR^8C(O)O-$, $-(CH_2)_qOC(O)NR^8-$, $-(CH_2)_qNR^8C(O)NR^8-$ (in which the groups R^8 are the same or different), $-(CH_2)_qO-$, $-(CH_2)_qSO_3-$, and a valence bond and p is from 1 to 12 and R^8 is hydrogen or a C_1-C_4 alkyl group;

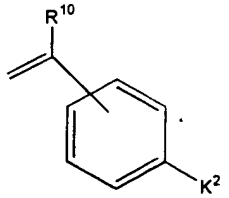
and R^4 is an aromatic group; and

c) a cross-linking monomer of the general formula III

$$(Y^2)_nR^9 \qquad \text{III}$$

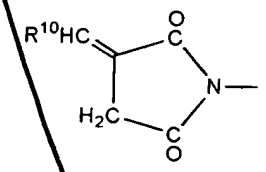
in which n is an integer of at least 2, each Y^2 is selected from the group consisting of



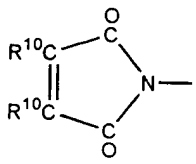


Sub B1 cont'd

$CH_2=C(R^{10})$-CH_2-O-, $CH_2=C(R^{10})$-CH_2 OC(O)-, $CH_2=C(R^{10})OC(O)$-, $CH_2=C(R^{10})$-O-, $CH_2=C(R^{10})CH_2OC(O)N(R^{11})$-, $R^{12}OOCCR^{10}=CR^{10}C(O)$-O-, $R^{10}CH=CHC(O)O$-, $R^{10}CH=C(COOR^{12})CH_2$-C(O)-O-,



and



wherein:

R^{10} is hydrogen or a C_1-C_4 alkyl group;

R^{11} is hydrogen or a C_1-C_4 alkyl group;

R^{12} is hydrogen or a C_{1-4} alkyl group;

A^2 is -O- or $-NR^{11}$-;

K^2 is selected from the group consisting of $-(CH_2)_rOC(O)$-, $-(CH_2)_rC(O)O$-, $-(CH_2)_rOC(O)O$-, $-(CH_2)_rNR^{12}$-, $-(CH_2)_rNR^{12}C(O)$-, $-(CH_2)_rC(O)NR^{12}$-, $-(CH_2)_rNR^{12}C(O)O$-, $-(CH_2)_rOC(O)NR^{12}$-, $-(CH_2)_rNR^{12}C(O)NR^{12}$- (in which the groups R^{12} are the same or different), $-(CH_2)_rO$-, $-(CH_2)_rSO_3$ - and a valence bond and r is from 1 to 12 and R^{12} is hydrogen or a C_1-C_4 alkyl group;

and R^9 is an n-functional organic group.

33. A polymer according to claim 32 in which R^4 is benzyl or phenyl.

34. A polymer according to claim 32 in which Y and Y^2 are the same, and are $CH_2=CR^xCOA$, in which R^x is methyl or hydrogen and A is O.

35. A polymer according to claim 32 in which the cross-linking monomer comprises a compound of the general formula III in which R^9 is an aromatic group.

36. A polymer according to claim 32 in which the crosslinking monomer comprises a compound of the formula III in which R^9 is an aliphatic group.

37. A polymer according to claim 32 in which the monomers include a mixture of at least two cross-linking monomers of the general formula III, in at least one of which R^9 is an aromatic group and in at least one of which R^9 is an aliphatic group.

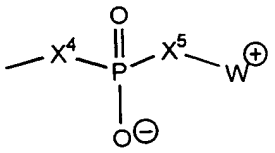
38. A polymer according to claim 37 in which the molar ratio of crosslinking monomer in which R^9 is aromatic to crosslinking monomer in which R^9 is aliphatic is in the range 10:1 to 1:10, preferably 5:1 to 1:5, most preferably 2:1 to 1:2.

39. A polymer according to claim 32 in which the zwitterionic monomer is present in molar amount in the range 1 to 95% based on total ethylenically unsaturated monomer.

40. A polymer according to claim 32 in which the aromatic group containing monomer is present in a molar amount in the range 10 to 99% based on total ethylenically unsaturated monomer.

41. A polymer according to claim 32 in which the crosslinking monomer is present in a molar amount in the range 0.01 to 10% based on total ethylenically unsaturated monomer.

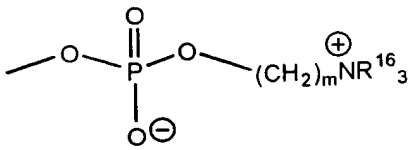
42. A polymer according to claim 32 in which the zwitterionic group has the general formula IV



IV

in which the moieties X^4 and X^5, which are the same or different, are -O-, -S-, -NH- or a valence bond and W^+ is a group comprising an ammonium, phosphonium or sulphonium cationic group and a group linking the anionic and cationic moieties which is a C_{1-12}-alkylene group.

43. A polymer according to claim 42 in which X is a group of formula V:



V

where the groups R^{16} are the same or different and each is hydrogen or C_{1-4} alkyl, and

m is from 1 to 4.

44. A gel comprising a polymer according to claim 32 swollen by a liquid.

45. A gel according to claim 44 in which the liquid is aqueous.

46. A refractive device formed of a polymer according to claim 32.

47. A device according to claim 46 which has an average transmission for visible light in the range 400 to 700nm wavelength of at least 90% when swollen by water.

48. A device according to claim 46 which comprises an absorber of electromagnetic radiation.

49. A device according to claim 46, having a refractive index when fully swollen in water in the range 1.45-1.60.

50. A polymerisation process in which a polymerisation mixture containing ethylenically unsaturated monomers is subjected to radical polymerisation, whereby addition polymerisation of the ethylenically unsaturated groups takes place, and in which the monomers include

a) a zwitterionic monomer of the general formula I

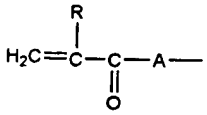
YBX I

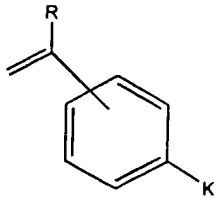
wherein

B is a straight or branched alkylene, oxaalkylene or oligo-oxaalkylene chain optionally containing one or more fluorine atoms or, if X or Y contains a terminal carbon atom bonded to B, a valence bond;

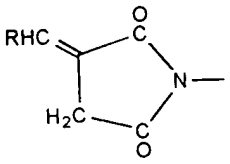
X is a zwitterionic group; and

Y is an ethylenically unsaturated polymerisable group selected from the group consisting of

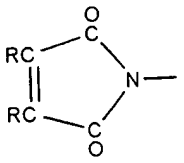




$CH_2=C(R)-CH_2-O-$, $CH_2=C(R)-CH_2$ $OC(O)-$, $CH_2=C(R)OC(O)-$, $CH_2=C(R)-O-$, $CH_2=C(R)CH_2OC(O)N(R^1)-$, $R^2OOCCR=CRC(O)-O-$, $RCH=CHC(O)O-$, $RCH=C(COOR^2)CH_2-C(O)-O-$,



and



wherein:

R is hydrogen or a C_1-C_4 alkyl group;

R^1 is hydrogen or a C_1-C_4 alkyl group or R^1 is -B-X where B and X are as defined above; and

R^2 is hydrogen or a C_{1-4} alkyl group or BX where B and X are as defined above;

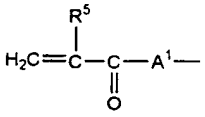
A is -O- or -NR^1-;

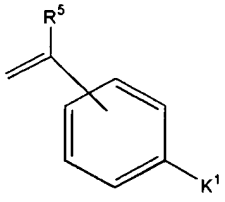
K is selected from the group consisting of -$(CH_2)_pOC(O)$-, -$(CH_2)_pC(O)O$-, - $(CH_2)_pOC(O)O$-, -$(CH_2)_pNR^3$-, -$(CH_2)_pNR^3C(O)$-, -$(CH_2)_pC(O)NR^3$-, -$(CH_2)_pNR^3C(O)O$-, -$(CH_2)_pOC(O)NR^3$-, -$(CH_2)_pNR^3C(O)NR^3$- (in which the groups R^3 are the same or different), -$(CH_2)_pO$-, -$(CH_2)_pSO_3$-, and optionally in combination with B, a valence bond and p is from 1 to 12 and R^3 is hydrogen or a C_1-C_4 alkyl group.

b) an aromatic group containing monomer of the general formula II

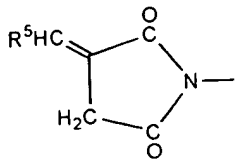
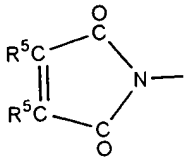
$$Y^1R^4 \qquad \text{II}$$

wherein Y^1 is selected from the group consisting of





$CH_2=C(R^5)$-CH_2-O-, $CH_2=C(R^5)$-CH_2 OC(O)-, $CH_2=C(R^5)OC(O)$-, $CH_2=C(R^4)$-O-, $CH_2=C(R^5)CH_2OC(O)N(R^6)$-, $R^7OOCCR^5=CR^5C(O)$-O-, $R^5CH=CHC(O)$O-, $R^5CH=C(COOR^7)CH_2$-C(O)-O-,


and


wherein:

R^5 is hydrogen or a C_1-C_4 alkyl group;

R^6 is hydrogen or a C_1-C_4 alkyl group or R^6 is R^4;

R^7 is hydrogen or a C_{1-4} alkyl group or R^4;

A^1 is -O- or -NR^6-;

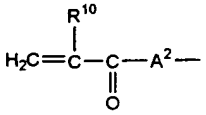
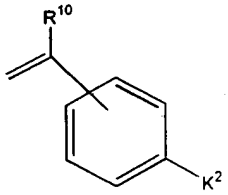
K^1 is selected from the group consisting of -$(CH_2)_qOC(O)$-, -$(CH_2)_qC(O)O$-, -$(CH_2)_qOC(O)O$-, -$(CH_2)_qNR^8$-, -$(CH_2)_qNR^8C(O)$-, -$(CH_2)_qC(O)NR^8$-, -$(CH_2)_qNR^8C(O)O$-, -$(CH_2)_qOC(O)NR^8$-, -$(CH_2)_qNR^8C(O)NR^8$- (in which the groups R^8 are the same or different), -$(CH_2)_qO$-, -$(CH_2)_qSO_3$ -, and a valence bond and p is from 1 to 12 and R^8 is hydrogen or a C_1-C_4 alkyl group;

and R^4 is an aromatic group; and

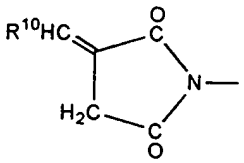
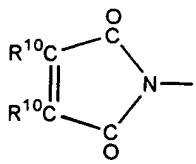
c) a cross-linking monomer of the general formula III

$$(Y^2)_nR^9 \qquad \text{III}$$

in which n is an integer of at least 2, each Y^2 is selected from the group consisting of

$CH_2=C(R^{10})$-CH_2-O-, $CH_2=C(R^{10})$-CH_2 OC(O)-, $CH_2=C(R^{10})OC(O)$-, $CH_2=C(R^{10})$-O-, $CH_2=C(R^{10})CH_2OC(O)N(R^{11})$-, $R^{12}OOCCR^{10}=CR^{10}C(O)$-O-, $R^{10}CH=CHC(O)O$-, $R^{10}CH=C(COOR^{12})CH_2$-C(O)-O-,


and


wherein:

R^{10} is hydrogen or a C_1-C_4 alkyl group;

R^{11} is hydrogen or a C_1-C_4 alkyl group;

R^{11} is hydrogen or a C_{1-4} alkyl group;

A^2 is -O- or -NR^{11}-;

K^2 is selected from the group consisting of -$(CH_2)_rOC(O)$-, -$(CH_2)_rC(O)O$-, - $(CH_2)_rOC(O)O$-, -$(CH_2)_rNR^{12}$-, -$(CH_2)_rNR^{12}C(O)$-, -$(CH_2)_rC(O)NR^{12}$-, -$(CH_2)_rNR^{12}C(O)O$-, -$(CH_2)_rOC(O)NR^{12}$-, -$(CH_2)_rNR^{12}C(O)NR^{12}$- (in which the groups R^{12} are the same or different), -$(CH_2)_rO$-, -$(CH_2)_rSO_3$ - and a valence bond and r is from 1 to 12 and R^{12} is hydrogen or a C_1-C_4 alkyl group;

and R^9 is an n-functional organic group.

51. A process according to claim 50 in which the zwitterionic monomer is present in molar amount in the range 1 to 95% based on total ethylenically unsaturated monomer.

52. A process according to claim 50 in which the aromatic group containing monomer is present in a molar amount in the range 10 to 99% based on total ethylenically unsaturated monomer.

53. A process according to claim 50 in which the crosslinking monomer is present in a molar amount in the range 0.01 to 10% based on total ethylenically unsaturated monomer.

54. A process according to claim 50 in which polymerisation is initiated by a thermal, a redox or a U.V. initiator.

55. A process according to claim 50 in which the zwitterionic monomer and aromatic group containing monomer are immiscible in the absence of a co-solvent, and in which the polymerisation mixture contains a co-solvent which is a non-polymerisable liquid whereby the polymerisation mixture is a homogeneous solution.

56. A process according to claim 55 in which the co-solvent is an alcohol.

57. A process according to claim 55 in which the co-solvent is present in the polymerisation mixture in an amount in the range 5 to 90% by weight.

58. A process of forming a refractive device in which a polymerisation process according to claim 55 is carried out, the co-solvent is removed from the product polymer to form a xerogel which is substantially free of co-solvent, and the xerogel is shaped by cutting to a predetermined three dimensional shape.

59. A process according to claim 58 in which the refractive device is an intraocular lens.

60. A process of forming a refractive device in which a polymerisation process according to claim 55 is carried out whilst the polymerisation mixture is in a mould and, after polymerisation, the solvent is removed from the polymer.

61. A process according to claim 58 in which after the said cutting step, the xerogel is swollen in aqueous liquid.

62. A polymer according to claim 35 in which R^9 is a bisphenol A group.

63. A polymer according to claim 36 in which R^9 is an ethylene or an oligo (ethyleneoxy) ethylene group.

64. A polymer according to claim 37 in which the aromatic group is a bisphenol A group and the aliphatic group is an ethylene or oligo(ethyleneoxy) ethylene group.

65. A polymer according to claim 32 in which the zwitterionic monomer is present in a molar amount in the range 10 to 25%. The aromatic group containing monomer is present in a molar amount in the range 75 to 90% and the cross-linking monomer is present in a molar amount in the range 0.5 to 3%, each based on total ethylenically unsaturated monomer.

66. A polymer according to claim 42 in which X^4 and X^5 are O and W^+ is a group of formula $-W^1-N^+R^{14}_3$, $-W^1-P^+R^{15}_3$, $-W^1-S^+R^{15}_2$ or $-W^1-Het^+$ in which:

W^1 is alkylene of 2-6 carbon atoms optionally containing one or more ethylenically unsaturated double or triple bonds, disubstituted-aryl, alkylene aryl, aryl alkylene, or alkylene aryl alkylene, disubstituted cycloalkyl, alkylene cycloalkyl, cycloalkyl alkylene or alkylene cycloalkyl alkylene, which group W^1 optionally contains one or more fluorine substituents and/or one or more functional groups; and

either the groups R^{14} are the same or different and each is hydrogen, selected from the group consisting of alkyl of 1 to 4 carbon atoms and aryl, or two of the groups R^{14} together with the nitrogen atom to which they are attached form a heterocyclic ring containing from 5 to 7 atoms or the three groups R^{14} together with the nitrogen atom to which they are attached form a fused ring structure containing from 5 to 7 atoms in each ring, and optionally one or more of the groups R^{14} is substituted by a hydrophilic functional group, and

the groups R^{15} are the same or different and each is R^{14} or a group OR^{14}, where R^{14} is as defined above; or

Het is an aromatic nitrogen-, phosphorus- or sulphur- containing ring.

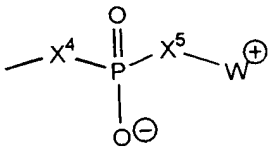
67. A polymer according to claim 43 in which m is 2 and each R^{16} is methyl.

68. A process according to claim 60 in which the solvent is removed from the polymer after the polymer has been removed from the mould, and in which the polymer is subsequently swollen in an aqueous liquid.

69. A process according to claim 50 in which the monomers include a mixture of at least two cross-linking monomers of the general formula III, in at least one of which R^9 is an aromatic group and in at least one of which R^9 is an aliphatic group.

70. A process according to claim 69 in which the zwitterionic monomer is present in a molar amount in the range 10 to 25%. The aromatic group containing monomer is present in a molar amount in the range 75 to 90% and the cross-linking monomer is present in a molar amount in the range 0.5 to 3%, each based on total ethylenically unsaturated monomer.

71. A process according to claim 50 in which the zwitterionic group has the general formula IV



IV

in which the moieties X^4 and X^5, which are the same or different, are -O-, -S-, -NH- or a valence bond and W^+ is a group comprising an ammonium, phosphonium or sulphonium cationic group and a group linking the anionic and cationic moieties which is a C_{1-12}-alkylene group.

72. A process according to claim 71 in which X is a group of formula V: